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THE ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES
CONTENTS OF VOLUME 73

1990 MAY, Number 1

		Page	Fiche
OBSERVATIONAL TESTS FOR THE EVOLUTION OF MASSIVE STARS IN NEARBY GALAXIES	*Claus Leitherer*	1	17-B1
LITHIUM IN HALO STARS FROM STANDARD STELLAR EVOLUTION	*Constantine P. Deliyannis, Pierre Demarque, and Steven D. Kawaler*	21	17-C11
CARBON, NITROGEN, AND OXYGEN ABUNDANCES IN THE CHEMICALLY PECULIAR STARS OF THE UPPER MAIN SEQUENCE	*Scott W. Roby and David L. Lambert*	67	17-G9
RAPID CONTINUUM LEVEL VARIABILITY IN Be STARS EARLIER THAN B2	*K. K. Ghosh*	103	18-D1
INSTRUCTIONS TO AUTHORS		i	18-E1

1990 JUNE, Number 2

PROCEEDINGS OF THE SECOND WORKSHOP ON IMPULSIVE SOLAR FLARES AT THE UNIVERSITY OF NEW HAMPSHIRE, 1988 SEPTEMBER 26–28

		Page	Fiche
FOREWORD	*Edward L. Chupp*	i	19-A6
OPTICAL PROPERTIES OF IMPULSIVE FLARES	*Harold Zirin and Frances Tang*	111	19-B1
SOFT X-RAY SPECTROSCOPY OF SOLAR FLARES: AN OVERVIEW	*G.A. Doschek*	117	19-B13
OBSERVATIONAL CLUES TO THE ENERGY RELEASE PROCESS IN IMPULSIVE SOLAR BURSTS	*David Batchelor*	131	19-D3
HIGH-VELOCITY EVAPORATION DURING THE IMPULSIVE PHASE OF THE 1984 APRIL 24 FLARE	*E. Antonucci, M. A. Dodero, and R. Martin*	137	19-D11
VELOCITY-TEMPERATURE DISTRIBUTION IN THE EVAPORATING PLASMA DURING THE IMPULSIVE PHASE OF SOLAR FLARES	*E. Antonucci, M. A. Dodero, and R. Martin*	147	19-E11
NONPOTENTIAL MAGNETIC FIELDS AT SITES OF GAMMA-RAY FLARES	*M. J. Hagyard, P. Venkatakrishnan, and J. B. Smith, Jr.*	159	19-F13
METER-DECIMETER AND MICROWAVE RADIO OBSERVATIONS OF SOLAR FLARES	*M. Pick, K.-L. Klein, and G. Trottet*	165	19-G13
A HIGH-SPEED SHOCK WAVE IN THE IMPULSIVE PHASE OF THE 1984 APRIL 24 FLARE	*H. Nakajima, S. Kawashima, N. Shinohara, Y. Shiomi, S. Enome, and E. Rieger*	177	20-B1
RISE TIMES IN SOLAR RADIO BURSTS	*J. E. R. Costa and E. Correia*	185	20-C1
ON REMOVAL OF THE GRADUAL COMPONENT IN ANALYSES OF SOLAR IMPULSIVE BURSTS	*J. E. R. Costa, J. C. Brown, E. Correia, and P. Kaufmann*	191	20-C11
ION AND RELATIVISTIC ELECTRON TRANSPORT IN SOLAR FLARES	*R. Ramaty, J. A. Miller, X.-M. Hua, and R. E. Lingenfelter*	199	20-D9
NEUTRONS AND GAMMA-RAY EMISSION ON 1982 JUNE 3: THE POSSIBILITY OF FITTING THE DATA ON THE ASSUMPTION OF ONE POPULATION OF ACCELERATED PARTICLES	*V. G. Guglenko, Yu. E. Efimov, G. E. Kocharov, G. A. Kovaltsov, N. Z. Mandzhavidze, M. M. Terekhov, and L. G. Kocharov*	209	20-E9
EMISSION CHARACTERISTICS OF THREE INTENSE SOLAR FLARES OBSERVED IN CYCLE 21	*Edward L. Chupp*	213	20-F1
OBSERVATIONS OF SOLAR FLARE GAMMA-RAY SPECTRA WITH THE *HINOTORI* SATELLITE	*M. Yoshimori*	227	20-G5
ENERGETIC PARTICLES FROM IMPULSIVE SOLAR FLARES	*Donald V. Reames*	235	21-A1

THE RELATIONSHIP BETWEEN ENERGETIC PARTICLES AND FLARE PROPERTIES FOR IMPULSIVE SOLAR FLARES . . . . . *H. V. Cane and D. V. Reames* 253 21-B7

SIGNATURE OF THE SOLAR COSMIC-RAY EVENT ON 1982 JUNE 3
H. Debrunner, E. O. Flückiger, and J. A. Lockwood 259 21-C1

SPECTRA OF RELATIVISTIC SOLAR PROTON GROUND-LEVEL EVENTS RECORDED AT SANAE, ANTARCTICA . . . . . *P. H. Stoker and S. Makgamathe* 263 21-C9

WERE SOLAR NEUTRONS OBSERVED BY NEUTRON MONITORS ON 1984 APRIL 25?
D. F. Smart, M. A. Shea, E. O. Flückiger, H. Debrunner, and J. E. Humble 269 21-D5

SOLAR NEUTRON DECAY PROTON OBSERVATIONS IN CYCLE 21
Paul Evenson, Richard Kroeger, Peter Meyer, and Donald Reames 273 21-D13

A 153 DAY PERIODICITY IN THE OCCURRENCE OF SOLAR FLARES PRODUCING ENERGETIC INTERPLANETARY ELECTRONS
Wolfgang Dröge, Kenneth Gibbs, John M. Grunsfeld, Peter Meyer, Brian J. Newport, Paul Evenson, and Dan Moses 279 21-E7

SOLAR ENERGETIC PARTICLE OBSERVATIONS OF THE 1982 JUNE 3 AND 1980 JUNE 21 GAMMA-RAY / NEUTRON EVENTS . . . . . *M. A. I. Van Hollebeke, F. B. McDonald, and J. P. Meyer* 285 21-F1

A SEARCH FOR SOLAR NEUTRON RESPONSE IN NEUTRON MONITOR DATA . . . . . *K. Kudela* 297 21-G3

IMPACT LINE LINEAR POLARIZATION AS A DIAGNOSTIC OF 100 keV PROTON ACCELERATION IN SOLAR FLARES . . . . . *J. C. Hénoux, G. Chambe, D. Smith, D. Tamres, N. Feautrier, M. Rovira, and S. Sahal-Bréchot* 303 21-G11

PROMPT ION ACCELERATION TO RELATIVISTIC ENERGIES BY A LARGE-AMPLITUDE MAGNETOSONIC WAVE . . . . . *Yukiharu Ohsawa* 313 22-A11

PROMPT PARTICLE ACCELERATION AND PLASMA JET FORMATION DURING CURRENT LOOP COALESCENCE IN SOLAR FLARES . . . . . *Jun-ichi Sakai* 321 22-B7

NEUTRAL BEAMS IN TWO-RIBBON FLARES AND IN THE GEOMAGNETIC TAIL
P. C. H. Martens and A. Young 333 22-C9

BEAM HEATING IN SOLAR FLARES: ELECTRONS OR PROTONS?
J. C. Brown, M. Karlicky, A. L. MacKinnon, and G. H. J. van den Oord 343 22-D9

SOLAR FLARE γ-RAY LINE SHAPES . . . . . *C. Werntz, F. L. Lang, and Y. E. Kim* 349 22-E5

1990 JULY, Number 3

A 1.49 GHz ATLAS OF THE *IRAS* BRIGHT GALAXY SAMPLE
J. J. Condon, G. Helou, D. B. Sanders, and B. T. Soifer 359 23-B1

ON THE OBSERVABILITIES OF THE CHIMNEY MODEL OF THE INTERSTELLAR MEDIUM
Fan Li and Satoru Ikeuchi 401 23-F5

THE ULTRAVIOLET CALIBRATION OF THE *HUBBLE SPACE TELESCOPE*. IV. ABSOLUTE *IUE* FLUXES OF *HUBBLE SPACE TELESCOPE* STANDARD STARS . . . . . *R. C. Bohlin, A. W. Harris, A. V. Holm, and C. Gry* 413 24-B1

OUTBURST SPECTRA OF 11 DWARF NOVAE . . . . . *Paula Szkody, François Piché, and Laurie Feinswog* 441 24-E1

A MULTIWAVELENGTH STUDY OF THE CARLSON-HENIZE SAMPLE OF EARLY-TYPE GALACTIC EXTREME EMISSION-LINE STARS
Steven N. Shore, Douglas N. Brown, B. W. Bopp, C. R. Robinson, N. Sanduleak, and P. D. Feldman 461 24-F11

ON THE PROBLEM OF THE *HIPPARCOS* REFERENCE FRAME *M. G. Lattanzi, B. Bucciarelli, and P. L. Bernacca* 481 25-A7

LOWER SOLAR CHROMOSPHERE-CORONA TRANSITION REGION. II. WAVE PRESSURE EFFECTS FOR A SPECIFIC FORM OF THE HEATING FUNCTION . . . . . *D. Tod Woods, Thomas E. Holzer, and Keith B. MacGregor* 489 25-B5

EFFECTIVE RECOMBINATION COEFFICIENTS OF NEUTRAL CARBON AND SINGLY IONIZED NITROGEN
Vladimir Escalante and G. A. Victor 513 25-D7

NEW TABULATION OF THE BOUND-CONTINUUM OPTICAL OSCILLATOR STRENGTH IN HYDROGENIC ATOMS . . . . . *Kazem Omidvar and Patricia T. Guimaraes* 555 26-C1

1990 AUGUST, Number 4

PROPERTIES OF THE REDSHIFT. I. DATA AND CALIBRATIONS ..... *W. G. Tifft* 603 26-B1

THE STELLAR CONTENT OF CENTRAL DOMINANT GALAXIES. I. CCD SURFACE PHOTOMETRY
Glen Mackie, N. Visvanathan, and D. Carter 637 26-D13

THE H II REGIONS OF M101. I. AN ATLAS OF 1264 EMISSION REGIONS
Paul W. Hodge, Mark Gurwell, Jeffrey D. Goldader, and Robert C. Kennicutt, Jr. 661 26-F13

BVI PHOTOMETRY OF GLOBULAR CLUSTERS IN M87 ... *Jean Couture, William E. Harris, and J. W. B. Allwright* 671 27-D9

COLOR EXCESSES, INTRINSIC COLORS, AND ABSOLUTE MAGNITUDES OF GALACTIC AND LARGE MAGELLANIC CLOUD WOLF-RAYET STARS ..... *William D. Vacca and Ana V. Torres-Dodgen* 685 27-F1

THE EVOLUTION OF HORIZONTAL-BRANCH STARS: THEORETICAL SEQUENCES
Young-Wook Lee and Pierre Demarque 709 28-A1

STRUCTURE IN SMALL MOLECULAR CLOUDS: PEDESTALS AND CLUMPING
Loris Magnani, John M. Carpenter, Leo Blitz, Namir E. Kassim, and Biman B. Nath 747 28-D3

MASS-LOSING M SUPERGIANTS IN THE SOLAR NEIGHBORHOOD ..... *M. Jura and S. G. Kleinmann* 769 28-F5

EINSTEIN OBSERVATIONS OF GALACTIC SUPERNOVA REMNANTS ..... *Frederick D. Seward* 781 28-G9

TABLES AND INTERCOMPARISONS OF EVOLUTIONARY SEQUENCES OF MODELS FOR MASSIVE STARS
Chao-wen Chin and Richard B. Stothers 821 29-C11

NORTHERN MILKY WAY CARBON STARS: NEW CANDIDATES, *JHK* PHOTOMETRY, AND RADIAL VELOCITIES ..... *Marc Aaronson, Victor M. Blanco, Kem H. Cook, Edward W. Olszewski, and Paul L. Schechter* 841 29-F1

INDEX TO VOLUME 73 ..... i 29-G11

(*Continued from back cover*)

"Exact Expressions and Improved Approximations for Interaction Rates of Neutrinos with Free Nucleons in a High-Temperature, High-Density Gas." PAUL J. SCHINDER.

I investigate the accuracy of the approximations now in use for the reactions $\nu_{e,\mu,\tau}$, $\bar{\nu}_{e,\mu,\tau} + p, n \rightarrow \nu_{e,\mu,\tau}$, $\bar{\nu}_{e,\mu,\tau} + p, n$ (neutrino-nucleon scattering) and $\nu_e + n \leftrightarrow p + e^-$, $\bar{\nu}_e + p \leftrightarrow n + e^+$, under conditions typical of Type II supernova core collapse and the first tens of seconds of neutron star cooling. The exact expressions for the factors needed on the right-hand side of the neutrino transport equations are derived, and approximations are made by taking the limits $\varepsilon, T \ll m$, where ε is the neutrino energy, T is the temperature, and m is the mass of the interacting nucleon. These exact expressions are integrated numerically, the accuracy of the standard and improved approximations developed here is determined graphically, and the range of validity of the approximations is discussed.

"Observations of Double Stars and New Pairs. XIV." W. D. HEINTZ.

Visual and photographic measures listed for 1550 pairs were obtained in the time 1987.07–1989.90; they include 194 new double stars.

"Relativistic Free-Free Gaunt Factor of the Dense High-Temperature Stellar Plasma. II. Carbon and Oxygen Plasmas." NAOKI ITOH, KOICHI KOJO, AND MASAYUKI NAKAGAWA.

The pure Coulomb free-free Gaunt factors of the dense high-temperature carbon and oxygen plasmas are calculated by using the accurate relativistic cross section and are compared with the Gaunt factors derived by using Sommerfeld's exact nonrelativistic cross section. A wide range of electron degeneracy is accurately taken into account. Dramatic deviations from the nonrelativistic results are found for high-temperature cases. Results are presented in the form of extensive tables to facilitate applications.

"A New System of Precise Full-Disk Solar Surface Photometry." JUN NISHIKAWA.

A precise solar surface photometric observing system using two-dimensional CCD cameras was developed (CCD solar surface photometer), which made it possible to measure the intensity distribution of the whole Sun as accurately as 0.07% rms per pixel. Principles of the CCDSSP are uniform and frequent sampling of full-disk solar images with perfect sensitivity-calibrated two-dimensional CCD detectors, and precise measurements performed by a large number of photoelectrons which are detected using high-speed video image processings.